

How do microbes spread?

Microbes are too small to see with the naked eye and can reproduce at an astonishing rate. This activity can be used as an analogy to give learners an insight into the size and scale of microbes and also to illustrate how just how quickly bacteria can divide.

A hula-hoop and counters (or other similarly sized objects) can be used to give learners some idea of the sheer number of microbes that can occupy a very small area. The hula-hoop represents a pin-head and each counter represents a bacterium. Of course, bacteria vary in size depending on their variety; the counters represent one of the larger types of bacteria.

Learners could first estimate how many microbes could fit on this area. Counters are then placed within the hoop and once the area is completely filled, numbers are counted. To make counting simpler counters could be pre-bagged into 10s or 20s and the number of bags emptied during the activity counted up and a simple multiplication carried out. Further calculations could be done to work out how many similar sized microbes could cover a ruler or book.

A single-celled bacterium reproduces by dividing in half producing two, identical, new cells. If conditions are favourable, with plenty of nutrients and surroundings at the optimal temperature, some bacteria can divide very rapidly indeed. In 7 hours one bacterium could generate over 2 million bacteria! This is why it is so important to store food correctly and to wash hands frequently.

This simple demonstration requires a hula-hoop and approximately 500 counters per group. The counters could again be placed in bags of 10 for ease of counting. As before the hula-hoop represents a pin-head and the counters take the place of bacteria. How long will it take for the bacteria to cover the pin-head if they reproduce 20 minutes?

Place 10 counters in the hula-hoop and set a timer for 20 minutes. At 20 minute intervals each counter should be joined by another, representing the division of the bacteria. The number of counters (bacteria) should be recorded and the process repeated until the entire surface is covered. The results could be plotted onto a graph. Learners might wonder if the bacteria would keep on dividing indefinitely, this could provide an interesting area of research.



Figure 1: Hula-hoop and counters

Further work on microbes

There are a number of further activities that relate to microbes, including investigations into yeast, food production, composting and decay (figure 1&2).

Some of these activities involve the growth of microbes so advice must be sought in order to keep within health and safety guidelines.

For further information and advice, including ideas for practical work, contact Scottish Schools Education Research Centre (SSERC) sts@SSERC.org.uk Alternatively consult the current version of ASE publication “Be safe” which provides health and safety advice for primary schools.

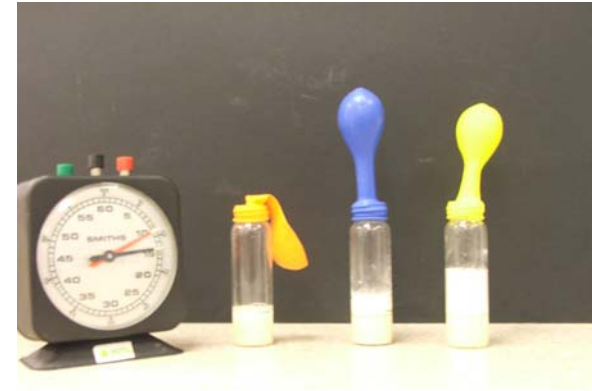


Figure 2: Experiments with yeast and fruit juices

Learners may wonder why humans are not constantly suffering from microbial infections and disease!

It is important to understand the relationship between humans and microbes in its proper context; alongside natural immunity and modern medical techniques e.g. vaccination. There is current debate surrounding the overuse of antibiotics and this may well have implications for the future of human health.